est twisted, sometimes flat, very thin: style slender, 0.5–1 mm. long: fruiting pedicels slender; the lowest 3–15 mm. long: stems glabrous or minutely stellate-pubescent.....17. *D. arabisans.*

n. Siliques densely stellate-tomentulose, only slightly compressed, hardly flat: racemes usually leafy-bracted at base.....18. *D. lanceolata.*

g. Flowering stem with strongly divergent branches: leaves laciniate or subpectinate: style filiform, 1.5–3 mm. long, ¼–⅓ as long as the spirally twisted stellate-pubescent silique: seeds 7–15, 1.2–1.8 mm. long.....19. *D. ramosissima.*

f. Annuals, winter-annuals or biennials, with bractless racemes: flowering stems leafy or with at least 1 pair of leaves above the basal rosette....*p.*

p. Siliques 1.7–6 mm. long, 6–16-seeded: petals (when developed) 2–3 mm. long: stems simple, or branching nearly to summit, with the numerous small leaves strigose with variously forking trichomes.

Stems with abbreviated corymbiform branches from the middle and upper axils: siliques linear-ellipsoid, 4–6 mm. long, minutely stellate-puberulent: seeds 1–1.5 mm. long.....20. *D. aprica.*

Stems mostly with elongate or leafy branches (or simple): siliques oblong-ellipsoid, 1.7–5 mm. long, glabrous: seeds 0.5–0.8 mm. long.....21. *D. brachycarpa.*

p. Siliques 5–18 mm. long, 15–80-seeded: petals (when well developed) 2–5 mm. long: stem simple or forking only below, hispid, at least below, like the leaves.

Flowers uniform, with yellowish (finally whitish) narrowly cuneate petals about 2 mm. long: leaves scattered nearly to the slender and elongate racemes: siliques 3–13 mm. long.....22. *D. nemorosa.*

Flowers heteromorphic, some with broad white petals 3.5–5 mm. long, others with reduced petals, others apetalous and cleistagomous: leaves mostly near the base: flowering stems and branches subscapiform: racemes comparatively short and thick: siliques 6–18 mm. long.

Leaves obviously dentate, hispid with stipitate and sessile forking trichomes: fruiting raceme elongate, its rachis and pedicels pubescent.23. *D. cuneifolia.*

Leaves entire or only obscurely dentate, hirsute-ciliate with simple trichomes, stellate-pubescent on the lower surface: fruiting raceme short and umbelliform, its rachis and pedicels glabrous..24. *D. reptans.*

a. Petals deeply cleft: annuals or winter-annuals: flowering stems naked scapes arising from basal rosettes.....25. *D. verna.*

(*To be continued*)

PAST PERIODS OF EELGRASS SCARCITY[1]

CLARENCE COTTAM

FRAGMENTARY bits of evidence have been obtained which clearly indicate that there have been past periods of eelgrass (*Zostera marina*)

[1] Published with aid to RHODORA from the National Academy of Sciences.

scarcity, probably however not to be compared in intensity or completeness with the present catastrophe. In the Shooting Journal of George Henry Mackay from 1865 to 1922,[1] page 351, he records under date of March 18, 1894, "There is a great scarcity of shellfish food in this locality [Muskeget Island, Massachusetts] at present, and large quantities (acres) of the eelgrass on which the Brant feed have been killed during the past winter. Still there is a good deal left." So far as the writer has yet found, this is the only published record of an exact date when there was a scarcity of the plant; however, from many places along the coast, old time hunters or fishermen have been met who recall a time, "years ago," or "about 40 years ago," or "nearly 50 years ago," or "about 25 years ago," etc., when the plant partially or largely died out in a given section. At Penobscot Bay, Maine, a fisherman told of a time "about 40 years ago" when practically all the "grass" disappeared in the bay so that several years elapsed before it was again abundant. Forty years back would place the date in the winter of 1893–94.

Further corroborative evidence that the eelgrass was greatly reduced along much of our Atlantic coast at about this same time is contained in a letter received from Mr. H. E. Perkins of Shelter Island, New York. Mr. Perkins reported that he has records (including those of his father and others) covering a period of 80 years. Under date of January 17, 1933, he wrote that in 1894 at Penobscot, Maine, on the northern branch of the Bagaduce River " . . . the mud flats were smooth with no grass on them, but from then on the grass kept growing longer and thicker until it got so you could not row a boat through it." He further writes, "Last year [winter of 1931–32] here [New York coast] it died out as it did in most places along the Atlantic coast. As a boy I talked with the old residents about the eelgrass dying out and they told me that about 1854 . . . (it) . . . died but grew again. According to my own observation and that of others, the eelgrass in this particular part of Maine coast has died out three times in the last eighty years."

Other evidence strongly suggests that the winter of 1893–94 was one in which the eelgrass was more or less diminished along much of the coast. A guide from the Honga River Gunning Club on the Chesapeake, Dorchester County, Maryland, remarked that the eelgrass died out almost completely in his section "about 40 years ago" (1893–94) and that it was "several years" in returning. A similar account was received from a gunner on Grassy Bay, New Jersey.

Reports from different sections indicate that somewhere about 1908 there was also a subnormal growth of the plant at least over a considerable portion of the New England coast. State Warden Babson of Newburyport, Massachusetts, spoke of a serious diminution of the plant at the mouth of the Merrimac River and a fish warden from Portland, Maine, mentioned a similar scarcity over much of that coast at about that same time (1908).

[1] Edited and printed privately by Dr. John C. Phillips. The Cosmos Press, Inc., Cambridge, Mass.

From a number of sources it seems evident that there have been local periods of scarcity at many places along the Atlantic seaboard. Many of these reports were indefinite as to date. Mr. William Harrison, a member of the Maryland Game Commission, informed me that in 1889 (at the time of the Johnstown flood) the eelgrass almost died out in the Chesapeake area and that it was upwards of 25 years before the maximum growth had returned. Two fishermen at Cape Cod, Massachusetts, stated that the eelgrass was noticeably scarce in Paponesset Bay 18 years ago (1915). Supt. Geo. Snook of the Haynes-Laster Game Preserve, Portsmouth Island, North Carolina, informed me that there was a noticeable reduction in the eelgrass crop in Pamlico Sound in 1917. A crop report from France indicates that 1913[1] was a year in which but little eelgrass was produced, and that in consequence the price nearly doubled.

A number of fishermen and coastal sportsmen reported that while there never before was a time of such widespread eelgrass scarcity as now, in one or more years the supply has been much below normal. Such reports of scarcity were heard along all sections of our coast. Many, and perhaps the majority of coastal sportsmen and fishermen, maintain that there has always been at least a fair supply of eelgrass. The above information, though fragmentary, seems to point to the fact that in the memory of man there has been no period of scarcity at all comparable with the present one. The fact, however, that there have been periods of marked reduction gives considerable encouragement to the hope that this period of serious diminution will gradually pass.

The present eelgrass catastrophe abruptly became evident and widespread along most of the North American coast in 1931 and 1932, with some evidence of the trouble in a few restricted localities late in 1930. It seems that in midsummer of 1931, in most localities from North Carolina to New England, the leaves of the eelgrass became somewhat darkened, broke from their roots, and washed ashore in great windrows. Before that summer was over, less than one percent of a normal stand of the plant existed in most affected areas.

The Canadian coast south of the Gulf of St. Lawrence was denuded by the fall of 1932 and when the ice cleared away in the spring of 1933 practically the entire area of the plant's regular range in that region was 99 percent devastated.

Most of the European coast from the Mediterranean to Sweden is known to be similarly affected. The disease appeared first along the French coast during the winter season of 1931–32 and rapidly spread from that point. Our Pacific coast appears to be unaffected.

A recent survey of the Atlantic coast shows a most perplexing condition. Some areas have made a definite progressive improvement since the first onslaught of the disease; others have produced a new growth only to be laid waste a short time later, while still other

[1] Daily Consular and Trade Reports, June 30, 1914, No. 152, pp. 1988–1990, Dept. of Commerce. The Seaweed Industry of France.

sections have grown progressively worse until practically every plant has been destroyed. With a few exceptions, those areas with a reduced salinity are making the best return, notable among these are portions of Chesapeake Bay, Maryland, Shinnecock Bay and Mecox Bay, Long Island, New York, and Swanquarter, North Carolina. Areas that show little or no improvement include Woods Hole, Massachusetts, South Oyster Bay, Long Island, New York., and portions of the more open and salty bays of New Jersey. Considering our entire (Atlantic U. S.) coast as a unit there appears to be some improvement although it is altogether too soon to predict what the future of the eelgrass will be.[1]

SUMMARY

1. From available evidence the eelgrass largely disappeared over the major portion of our Atlantic coast in 1893 and 1894 and it required several years before it had come back to normal abundance.

2. At least in the New England section a subnormal crop seoms to have been produced in 1908.

3. Evidence clearly indicates that there have been a number of local periods of eelgrass scarcity along the American Atlantic and European coasts.

4. In most sections the present catastrophe became abruptly evident in 1931 and 1932 with some evidence late in 1930; on the European coast, which is seriously affected, the malady was noticed first in France in the winter of 1931–32.

5. The eelgrass at present shows a perplexing condition; some areas show improvement while others do not.

6. It is much too soon to predict what the future of the eelgrass will be, although the fact that there were previous periods of scarcity or limited production of the plant, offers some encouragement to the hope that the malady will gradually pass.

UNITED STATES BIOLOGICAL SURVEY,
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A NEW VARIETY OF GLYCERIA GRANDIS AND A KEY TO ITS ALLIED SPECIES[2]

LEON KELSO

WHILE studying the new form of *Glyceria grandis* here described the writer had occasion to note the distinguishing characters of the allied species in northwest America and all Asia. Since no key has hitherto

[1] A number of short papers have appeared dealing with the recent eelgrass scarcity. As examples see Taylor, W. R., RHODORA, Vol. 35, pp 152–154 and 186; also see Cottam, C. Plant Disease Reporter, Vol. 17, No. 6, pp 46–53.

[2] Published with aid to RHODORA from the National Academy of Sciences.